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Method and apparatus for photoepilation.

Q The certain quantity of light energy sufficient to effect lifelessness in each of a particular type of hairs is provided to the tip of a hand held probe (18) each time a switch (22) is closed, independent of the duration of the switch closure. A foot switch (22) is actuated to provide a series of timed and spaced pulses of light energy for a period selectable by rotating a wiper of a variable resistor-capacitor circuit. The sum of

the energies of the pulses over the selected period equals the certain quantity of light energy. Alternatively, four foot switches can be provided, one of which can be depressed to provide one of four fixed periods of light pulses. Commonly, the certain quantity of light energy is first determined for the hair type and then that certain quantity is used for all the hairs of that type to be removed.

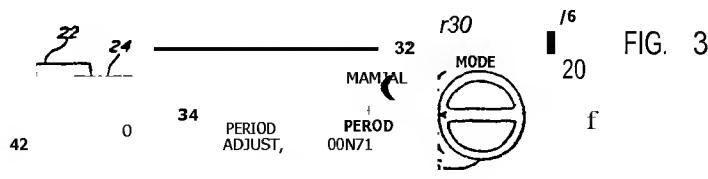


FIG. 3

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The operator then moves the tip of the probe, which sources the light energy, to the hair follicle and

5 positions it for applying properly the light energy to the hair follicle. The operator then depresses his or her foot on the foot pedal to close the switch therein and energize the photoepilation device, providing the light energy in timed and spaced pulses.

10 The number of pulses, or the time (which is proportional to the number of pulses) is counted by the operator either out loud or privately to apply the proper quantity of light energy to the hair follicle to effect lifelessness therein. When the proper quantity

15 of energy has been applied to the hair to kill the hair body or root, the operator lifts his or her foot from the foot pedal to stop production of the light energy, and removes the hair from the follicle with the tweezers held in his or her other hand. The operator then moves to the next hair to be removed and

20 repeats this entire demanding procedure.

The quantity of light energy produced by the device is regulated or dependant entirely and solely upon

25 the length of time that the operator depresses the foot pedal of the switch assembly.

The electrologist, thus, to remove one hair, must have excellent motor skills to coordinate simultaneous

30 movement of his or her head and eyes, both hands and one foot. Further, this procedure is tiring because of the physical and mental demands placed upon the electrologist to perform for extended periods.

35 It is desirable to alleviate at least one of the demands made of the electrologist.

Figure 3 is a front side view of another embodiment of the apparatus of the invention; and

Figure 4 is a block diagram of the other embodiment of the apparatus of the invention.

- 10 In Figure 1, an electrologist or operator 10 is removing hair from the back 12 of a patient 14 using a proximately located photoepilation apparatus indicated generally by the reference character 16. Apparatus 16 comprises a probe 18 held in the right hand of electro-
- 15 logist 10 and an optical cable 20 connecting the probe 18 to the apparatus 16. Optical cable 20 comprises flexible optical transmission means such as optical fibers. Apparatus 16 further includes a foot switch assembly 22 connected thereto by an electrical cable
- 20 24. Assembly 16 is operatively located under the right foot of the electrologist. The electrologist 10 comfortably is seated opposite the bare back 12 of the seated patient 14. The electrologist 10 wears an extended loupe carrying eyeglasses 26 better to see the hair
- 25 follicles on the patient's back 12 and holds a tweezers 28 in his or her left hand for removing lifeless hairs.

Typically all of the hairs or hair bodies to be removed from one region of a person's skin, such as face, arms, back, legs, are of one to three types, and the light energy that must be applied to each hair of one type to effect lifelessness therein is constant. Thus, once a particular quantity of light energy to effect lifelessness is established for a hair type, that quantity need only be repeatedly supplied to each hair root to perform the photoepilation.

cable 24 directly carries the signal indicating closing of contacts 42 to **variable** RC circuit 48 and 5 timer circuit 46. Timer 46 then produces a signal on wire 58 to selector 44 that has a period corresponding to that indicated by knob 34. In all three cases, mode selector circuit 44 includes a circuit to energize light source 38 and obtain regular timed and spaced 10 pulses of light therefrom. The timing and spacing of the pulses is fixed to obtain equal but incremental quantities from each pulse of light energy. The only variable afforded by the control circuit 41 thus is the number of pulses or incremental quantities of light 15 energy sourced to probe tip 40. The control circuit 41 does not count the number of pulses but provides them for a selected period.

In operation, the electrologist selects the variable 20 period mode by rotating knob 36 and selects a certain period corresponding to the quantity of light energy, in the form of the timed and spaced pulses, required to be sourced at the tip 40 to effect lifelessness in a particular type of hair body. Selection occurs by 25 rotation of knob 34 to vary the resistance or capaci-.. tance of circuit 48. The electrologist then adjusts his or her head to sight on one hair follicle, properly places the probe tip 40 in the vicinity of the follicle and depresses the foot pedal wiper 50 once. 30 The control circuit then automatically, and indepen- dently of the length of time that the contacts 42 are closed, causes a series of timed and spaced pulses of light energy, for the selected period, to be sourced to the probe tip 40, and therefrom to the hair body 35 to effect lifelessness therein. The electrologist then removes the lifeless hair body from the follicle, and moves to the next follicle, repeating the described procedure.

switches 78-84. Switch 84 provides a period of fifteen (15) minutes, switch 82 provides a period of ten (10) seconds, switch 80 provides a period of thirty (30) seconds and switch 50 provides a period of fifty (50) seconds.

Actuating any one switch 78-84 energizes the corresponding resistor-capacitor circuit and causes timer circuit 64 to produce pulsing signals on wire 90 for the selected period. The pulsing signals on wire 90 cause the flash lamp in light source 38 to flash at regular timed and spaced intervals for the period, providing equal energy light energy pulses at probe tip 40.

The photoepilation procedure performance with apparatus 60 is similar to the procedure performance with apparatus 16, except there is no setting of a mode or period. Instead, selecting a certain period occurs by selecting the desired foot actuated push button switch, which then is depressed to source the required quantity of light energy at the probe tip. Sourcing the light energy pulses is independent of the length of time that the selected switch is actuated.

Selection of the period or energy necessary to effect lifelessness in a particular type of hair is by experiment or otherwise as desired.

30

Known timing circuits, including monostable multivibrators, can provide the period signals in an apparatus 60. One circuit may provide each fixed period or one circuit may provide all four fixed periods. A known timing circuit, such as a monostable multivibrator can provide the single variable period circuit in apparatus 16. In either case, a circuit such as a monostable

electrologist because the duration of the selected period is independent of the duration of switch closure.

The apparatus of the invention comprises a flasch lamp and control circuit assembly, a hand held probe connected to the flash lamp by a bundle of flexible, optical fibers and a foot switch assembly electrically connected to the control circuit by a cable. The control circuit is operable, in reaction to actuation of the foot switch, to flash the lamp in timed and spaced pulses of equal light energy.

In one embodiment, the foot switch assembly comprises a plurality of switches, one switch for each of a plurality of fixed periods. Selecting the certain period then comprises placing the operator's foot above the switch corresponding to the quantity of light energy required to effect the lifelessness in the type of hair to be removed from the subject patient. Alternatively, the control circuit includes a variable timer for selecting the certain period and the foot switch assembly comprises one switch for commencing the period. Selecting the period thus comprises moving the wiper of a variable resistor or capacitor to a particular setting.

5. The photoepilation apparatus according to claim 4,
characterized in that said control circuit includes at
5 least one timer circuit (46, 64) operating for said
certain period to produce said light energy independent
of the length of time the switch (22, 74) is actuated.

6. The photoepilation apparatus according to claim 5,
10 characterized in that said timer circuit (46) includes
variable components (48) for setting said certain pe-
riod.

7. The photoepilation apparatus according to claim 5,
15 characterized in that said timer circuit (64) includes
a plurality of fixed components (66, 68, 70, 72) arran-
ged to provide a plurality of certain periods, and there
are a plurality of switches (78, 80, 82, 84) one for
each certain period, actuation of one switch energizing
20 the control circuit (62) for one certain period.

8. The photoepilation apparatus according to any one of
claims 4 to 7, characterized in that all switches are
foot-actuated switches.

25 9. The photoepilation apparatus according to any one
of claims 4 to 8, characterized in that the probe is
portable and capable of being hand-held during opera-
tion of said apparatus.

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EUROPEAN SEARCH REPORT

0142671
Application number

EP 84 11 1249

DOCUMENTS! CONSIDERED! TO! BE! RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.)
Y	US-A-4 388 924 (WEISSMAN et al.) * whole document *	1-9	A 61 B 17/36
Y	US-A-3 693 623 (HARTE et al.) * figures; column 3, lines 6-22; claims 1-7 *	1-9	
			TECHNICAL FIELDS SEARCHED (Int. Cl.)
			A 61 B A 61 F
The present search report has been drawn up for all claims			
Place of search	Date of completion of the search	Examiner	
THE HAGUE	20-12-1984	LOWE D.	
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